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CHARACTERISTIC FEATURES OF THE AGRICULTURAL YEAR 1963-1964  
AND THEIR INFLUENCE ON THE DISTRIBUTION OF MAJOR PESTS  
AND DISEASES IN 1964

Trudy Vsesoyuznogo Instituta  
Zashchity Rasteni (Transactions of  
the All-Union Institute of Plant  
Protection), Vol 25, pp 5-15, 1964

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It is generally known that agrotechnical measures and all of man's farm management activity have a decisive effect on the distribution of farm crop pests and diseases. At the same time the great influence of climatic factors, which becomes apparent in several directions, is preserved.

Wintering conditions are of great importance for some species, especially in the northern regions of the areal. Deviations of winter conditions toward greater duration of the period, its severity or the alternation of cold spells and thaws are of life-and-death importance. Conditions leading to a decrease in the numerical strength of a pest naturally predetermine a decrease in its destructiveness, but those favoring a good overwintering lead to its increase.

The second and most important aspect of the influence of climatic factors consists in the extent to which they determine the possibility of coincidence of the most vulnerable phase of the crop and the most injurious phase of the pest (disease). Depending on these circumstances, with the same numerical strength of harmful species their ultimate destructiveness can be substantially characterized.

It is also important to take into account the influence of climatic factors on the ability of crop plants to resist damage. The effect of climatic factors can be substantially strengthened or weakened by agrotechnical and farm management measures. For example, late-sown winter grain crops, being poorly developed in the spring, are more subject to damage by grain flies and beetles than well-developed crops planted within the optimum periods.

Finally, climatic factors have a great influence on the dates and quality of such measures as soil cultivation, sowing and crop management, harvesting and the amounts of output gathered and lost in the field. The effects of agrotechnical measures and even of chemical treatment of the young crops for harmful species prove to be sufficiently dependent on a combination of meteorological factors.

While taking the above into consideration it should be recognized that there can be a greater or smaller discrepancy between the prediction of the distribution of harmful species in the following year and their actual destructiveness. It can be especially significant for species with great variability in numbers, phenology and behavior. Among these, for example, belong many species of cutworms, grain flies, wireworms, beet webworms and corn borers, some species of flea beetles, and also most pathogens.

The general tendency of a phenomenon — increase, constancy or reduction of damage — is given on working out a forecast. The scales of deviation are not as yet predicted, since for this it is necessary to foresee all the principal aspects of the possible influence of weather on harmful species in the coming year, which is still impossible in view of the lack of long-term weather forecasts. Meanwhile in regard to a number of diseases (rust, smut, phytophthora of potatoes, apple scab) a mathematical method exists which permits foreseeing their intensity of manifestation half a year ahead according to a combination of the factors of the preceding periods.

The characteristics of the weather features of the past year and their significance for damageable crops and harmful species are given by us. On this background is examined the manifestation of destructiveness of the most important individual items and its conformity to prediction.

It is necessary then and there to note that on the whole the actual destructiveness of most pests and diseases and their distribution in 1964 agreed with the expected values. Considerably greater than was supposed were the distribution and destructiveness of the cabbage cutworm in the Ukrainian SSR and the central regions of the chernozem belt, the beet armyworm in Central Asia, the turnip moth in the Ukrainian SSR and Krasnodarskiy Kray, rusts on wheat crops in the Virgin and Fallow Land Development Zone. All these forms are very labile in their reactions to a change in ecological conditions.

In order to evaluate the characteristics of the agricultural year the results of the observations of 270 meteorological stations of the USSR were analyzed. Analysis of the materials was carried out by the method described in the collection Distribution of Farm Crop Pests and Diseases in the USSR in 1960 and Prediction of Their Appearance in 1961 (Leningrad, 1961). The characteristics of weather conditions are given according to the natural agricultural zones and provinces accepted in the VIZR Vsesoyuznyy Institut Zashchity Rasteniy: All-Union Institute of Plant Protection (Trudy VIZR /Transactions of the All-Union Institute of Plant Protection), 7,

No 22, 1964, pp 6-27).

The Northern Zone includes Arkhangel'skaya, Vologodskaya, Murmanskaya, Permskaya and Sverdlovskaya oblasts, the Karelian ASSR and the Komi ASSR.

The Non-chernozem Zone is subdivided into two provinces: the Western and Central Non-chernozem provinces. The Western province includes the Estonian SSR, Latvian SSR, Lithuanian SSR, Belorussian SSR, and Leningradskaya, Pskovskaya, Novgorodskaya and Kaliningradskaya oblasts; the Central Non-chernozem province includes Kalininskaya, Yaroslavl'skaya, Ivanovskaya, Vladimirskaya, Moskovskaya, Smolenskaya, Bryanskaya, Kaluzhskaya, Tul'skaya and Ryazanskaya oblasts.

The Northern Volga Zone includes Kostromskaya, Kirovskaya and Gor'kovskaya oblasts, the Tatar ASSR, Mari ASSR, Chuvash ASSR and Udmurt ASSR.

The Forest-steppe Zone is divided into three provinces: the Western Ukrainian, Southern Forest-steppe and Eastern Forest-steppe provinces. The Western Ukrainian province includes the Zakarpatskaya, L'vovskaya, Volyn'skaya, Rovenskaya, Ternopol'skaya, Ivano-Frankovskaya, Chernovitskaya, Vinitskaya, Khmel'nitskaya and Zhitomirskaya oblasts of the Ukrainian SSR and the northern regions of the Moldavian SSR; the Southern Forest-steppe province includes the Kiyevskaya, Cherkasskaya, Chernigovskaya, Poltavskaya, Kirovogradskaya, Sumskaya and Khar'kovskaya oblasts of the Ukrainian SSR, and Orlovskaya, Kurskaya, Belgorodskaya, Lipetskaya and Voronezhskaya oblasts; the Eastern Forest-steppe province includes Tambovskaya, Penzenskaya, and Ul'yankovskaya (the greater part) oblasts and the Mordvinian ASSR.

The Steppe Zone is subdivided into four provinces: the Southern Ukrainian, Central Volga, Ciscaucasian and Caspian Sea provinces. The southern regions of the Moldavian SSR, the Odesskaya, Nikolayevskaya, Dnepropetrovskaya, Khersonskaya, Krymskaya, Zaporozhskaya, Donetskaya and Luganskaya oblasts of the Ukrainian SSR form the Southern Ukrainian province; in the Central Volga province are Kuybyshevskaya, Saratovskaya and Volgogradskaya oblasts, the northern rayons of Rostovskaya Oblast and the southern rayons of Ul'yankovskaya Oblast; in the Ciscaucasian province are the southern rayons of Rostovskaya Oblast, Krasnodarskiy and Stavropol'skiy krays, the North Ossetinian ASSR, Kabardino-Balkarian ASSR and Checheno-Ingush ASSR; in the Caspian Sea province are Astrakhanskaya Oblast, the Kalmyk ASSR and Dagestan ASSR.

The Transcaucasian Zone includes the Azerbaydzhan SSR, Armenian SSR and Georgian SSR.

The Virgin and Fallow Land Development Zone is divided into four provinces: Southern Ural, Western Siberian, Central and Southern. Orenburgskaya, Chelyabinskaya and Kurganskaya oblasts and the Bashkir ASSR form the Southern Ural province; Tyumenskaya, Omskaya, Novosibirskaya and

Kemerovskaya oblasts and the southern rayons of Tomskaya Oblast form the Western Siberian province; the Central province includes Tselinnyy and Altayskiy krays and the northern agricultural rayons of the former Zapadno-Kazakhstanskiy Kray and Karagandinskaya, Semipalatinskaya and Vostochno-Kazakhstanskaya oblasts; the Southern province includes the southern rayons of the former Zapadno-Kazakhstanskiy Kray and Karagandinskaya, Semipalatinskaya and Vostochno-Kazakhstanskaya oblasts.

The Eastern Siberia and Transbaykal Zone includes Krasnoyarskiy Kray, Irkutskaya and Chitinskaya oblasts, Tuva ASSR, Buryat ASSR and Yakut ASSR.

The Far Eastern Zone includes Amurskaya, Kamchatskaya, Sakhalinskaya and Magadanskaya oblasts, and Khabarovskiy and Primorskiy krays.

The Central Asian Zone is divided into the Desert-steppe and Cotton-growing provinces. To the Desert-steppe province belong the steppe and semi-arid regions of the former Yuzhno-Kazakhstanskiy Kray and Alma-Atinskaya Oblast and the deserts of the Turkmen SSR; the Cotton-growing province includes the south of Alma-Atinskaya Oblast and of the former Yuzhno-Kazakhstanskiy Kray, and the principal cotton-growing regions of the Uzbek SSR, Tadzhik SSR, Kirgiz SSR and Turkmen SSR.

The summer of 1963 in most of the regions of the European part of the USSR was prolonged, relatively hot and dry; in the Asian part it was short and dry.

The autumn in most of the European territory of the USSR was late, short, cool and dry (Table 1). Having set in late, it ended later than the dates over a number of years, i. e. it seemed as though it were shifted in time toward the winter months. Therefore, in spite of the fact that the temperature of the autumn months was above the norm, on the average for the season it proved to be below it. Only in the southwestern and southern regions, where the onset of winter was noted on dates close to those for many years or earlier than them, was the autumn moderately warm, in places — warm. Sufficient humidification of the territory took place only in the eastern regions and the central regions adjacent to them of the Forest-steppe and Steppe zones, and also in the southern regions of the Central Volga Zone. A late, cool and relatively dry autumn was also observed in most of the Far Eastern Zone and the Eastern Siberia and Transbaykal zones; a late, short and moderately warm one in the Cotton-growing province of the Central Asian Zone and in the Southern Ural province of the Virgin and Unused Lands Development Zone. In most of the regions of this zone, and also in the Desert-steppe province of the Central Asian Zone autumn was early, prolonged, moderately warm and humid.

Weather conditions at summer's end and in the autumn favored a step-up in the destructiveness of grain flies throughout the European part of the USSR, which brought about the destruction of winter grain crops or heavy thinning out of them over very large areas in the autumn. These

Weather Characteristics of Autumn 1963 in Deviations from the  
Many-years' Norm

( + sign indicates later or more than the norm,  
- sign indicates earlier or less than the norm)

Table 1

Natural agricultural zone (province, regions)	Time of onset of period (day)	Duration of period (days)	Mean tem- perature of period (degrees)	Percent rainfall in period
Northern Zone	+ 15-25	- 10-20	- 0.5-1.5	50-80
Western regions	+ 25-30	—	- 1.5-2.5	80-120
Non-chernozem Zone	+ 15-25	—	—	60-100
Western province	—	- 10-20	- 1.0-0.0	—
Central Non-chernozem province	—	- 1-10	- 1.0-2.0	—
Northern Volga Zone	+ 10-20	- 10-20	- 1.0-0.0	60-100
Southern regions	—	—	—	80-120
Forest-steppe Zone	+ 5-15	- 1-10	+ 1.0-0.0	30-70
Western Ukrainian province	—	—	—	—
Southern Forest-steppe province (eastern regions)	—	+ 1-10	- 1.0-0.0	120-160
Eastern Forest-steppe province	—	+ 1-10	- 0.5-1.5	150-210
Steppe Zone	+ 1-10	- 1-10	+ 1.0-0.0	40-90
Southern Ukrainian province (west- ern regions)	—	—	+ 1.0-2.0	10-40
Central Volga province	—	+ 1-10	- 1.0-0.0	160-220
Ciscaucasian province	+ 5-15	- 10-20	here and there not over -1	—
Caspian Sea province	± 5	—	—	—
Transcaucasian Zone	+ 1-10	- 1-10	- 1.0-0.0	90-140
Western regions	- 1-10	—	—	—
Virgin and Fallow Land Development Zone	- 1-10	+ 5-15	+ 1.0-0.0	100-170
Southern Ural province	+ 1-10	- 1-10	—	60-100
Western Siberian province (north- ern regions)	+ 5-0	+ 5-0	- 1.0-0.0	60-100
Central province (eastern regions)	—	—	—	200-220
Southern province (eastern regions)	—	—	—	200-220
Eastern Siberia and Transbaykal Zone	+ 1-10	- 1-10	- 1.0-0.0	100-140
Western regions	—	+ 1-10	- 1.0-2.0	50-100
Southeastern regions	—	+ 1-5	- 0.5-1.5	60-100
Far Eastern Zone	± 5	+ 1-10	- 0.5-1.5	70-110
Western regions	—	- 1-10	± 0.5	40-80
Central Asian Zone	—	—	+ 1.0-0.0	—
Desert-steppe province	- 1-10	+ 10-20	—	60-100
Cotton-growing province	+ 1-10	- 1-10	—	100-160

conditions favored a good preparation for wintering and an increase in numbers of the turnip moth in 1964 in the Ukrainian SSR and Krasnodarskiy Kray, the gray grain cutworm in the Virgin and Fallow Land Development Zone, the cabbage cutworm in the Ukrainian SSR and the central regions of the chernozem belt, the beet armyworm in Central Asia and partly in the Lower Volga region and in the south of the Ukrainian SSR, the pentatomid and beet and flax flea beetles in the zones of their customary destructiveness. The summer-fall dry spell caused destruction of the egg masses and young larvae of grain beetles, somewhat reduced the numbers of the common beet weevil in its zone of large-scale destructiveness, and was unfavorable for the development of the grain carabids and European corn borer in the Northern Caucasus and the south of the Ukrainian SSR. The numbers of mouse-like rodents after the summer-fall dry spell were low (except for Transcaucasia), although conditions were favorable for them in the autumn, especially in the Caucasus.

The 1963-1964 winter in most of the northern and central regions of the European part of the USSR was late, short, with a shortage of rainfall, but cold (especially in the Forest-steppe Zone) and snowy; in the Central Volga Zone it was earlier, prolonged, moderately warm and not very snowy (Table 2). In the southern regions it began somewhat earlier than the dates for a number of years, was prolonged, cold, and wet, with a snow cover within the normal range, here and there below it. In the Asian territory of the USSR the winter proved to be close to the average indices in time of onset and duration, in most regions it was relatively wet, but warm and with little snow; in the southern regions of the Virgin and Fallow Land Development Zone and in the Desert-steppe province of the Central Asian Zone it was cold and snowy. Specific conditions arose within the boundaries of the Transcaucasian Zone and in the Cotton-growing province of the Central Asian Zone. Here winter set in earlier than the dates for a number of years and was long and cold, with a steady snow cover (in most of the foothill and mountain regions it lay there about two months).

The spring of 1964 in the European territory of the USSR set in somewhat late, in some regions it was relatively short and dry (especially in the Western province of the Non-chernozem Zone); in the Southern Forest-steppe and Eastern Forest-steppe provinces of the Forest-steppe Zone and the Southern Ukrainian and Central Volga provinces of the Steppe Zone it was prolonged and wet (Table 3). The mean temperature of the season in the northern regions and the central regions adjoining them proved to be below the norm; in the southern regions and the central regions adjoining them it was above the norm. An especially warm spring was noted in the Southern Forest-steppe province of the Forest-steppe Zone and the Southern Ukrainian province of the Steppe Zone. A relatively late, short and warm spring was also observed in most of the USSR's Asian territory. Only in the Cotton-growing province of the Central Asian Zone and in most regions of the Far Eastern Zone did it last longer than the norm. Rainfall was distributed less uniformly. In most of the Eastern Siberia and Transbaykal Zone, the Central and Western Siberian provinces of the Virgin and Fallow Land Development Zone, and also in the western regions of the Far Eastern Zone a rainfall shortage was noted. In

Table 2

## Weather Characteristics of the 1963/64 Winter in Deviations from the Many-years' Norm

(+ sign indicates later or more than the norm, - sign indicates earlier or less than the norm)

Natural agricultural zone (province, regions)	Time of onset of period (day)	Duration of period (days)	Mean tem- perature of period (degrees)	Percent rainfall in period	Depth of snow cover (cm)
Northern Zone	+ 1-10	- 1-10	- 1.0-0.0	75-105	- 1-10
Southwestern regions	+ 10-15	- 10-20	- 0.5-1.5	—	+ 1-10
Non-chernozem Zone	—	—	- 1.5-3.0	50-100	+ 5-15
Western province	+ 1-10	+ 5	—	—	—
Central Non-chernozem province	+ 10-15	- 10-20	—	—	—
Northern Volga Zone	+ 5	+ 5	+ 1.0-0.0	60-100	- 1-10
Southern regions	—	—	- 1.0-0.0	100-130	+ 5
Forest-steppe Zone	+ 1-10	+ 5	- 2.0-4.0	80-130	+ 15-20
Western Ukrainian province	—	—	—	—	—
Southern forest-steppe province (eastern re- gions)	+ 10-20	- 1-10	—	—	—
Eastern forest-steppe province	+ 15-25	- 10-20	- 1.0-2.0	—	+ 1-10
Steppe Zone	+ 5	+ 5-15	- 1.3-2.0	100-130	+ 5
Southern Ukrainian province (western regions)	- 5-10	+ 15-25	- 2.0-3.0	—	—
Central Volga province	+ 5-15	- 1-10	—	—	+ 1-10
Ciscaucasian province	- 1-10	+ 10-20	—	—	- 1-5
Caspian Sea province (southern regions)	- 5-15	+ 15-25	—	—	—
Transcaucasian Zone	+ 5	+ 1-10	- 1.5-3.0	90-140	+ 1-20
Virgin and Fallov Land Development Zone	+ 1-10	+ 1-10	+ 1.0-0.0	100-130	- 1-10
Southern Ural province (southern regions)	—	—	—	—	+ 1-10
Western Siberian province (eastern regions)	—	- 1-5	+ 1.0-2.0	75-100	- 5-25
Central province (eastern regions)	—	- 1-10	+ 1.5-2.5	80-110	- 10-20
Southern province (eastern regions)	—	- 1-10	+ 0.5	—	+ 1-10
Eastern Siberia and Transbaytal Zone	+ 5	+ 5	+ 0.5-1.5	100-160	- 1-10
Western regions	+ 1-10	—	- 1.0-3.0	—	—
Southern regions	—	—	—	60-100	—

[Table continued on following page]



Table 2 [continued]

Natural agricultural zone (province, regions)	Time of onset of period (day)	Duration of period (days)	Mean tem- perature of period (degrees)	Percent rainfall in period	Depth of snow cover (cm)
Far Eastern Zone	+ 1-10	- 1-10	+ 1.0-0.0	90-100	+ 1-5
Western regions	- 1-5	+ 5	+ 1.0-2.0	120-200	- 1-5
Central Asian Zone	—	—	—	—	+ 1-10
Desert-steppe province	+ 5-15	- 1-10	- 1.0-0.0	100-160	—
Cotton-growing province	- 1-10	+ 1-10	- 1.5-3.0	60-100	—

Table 3

Weather Characteristics of Spring 1964 in Deviations  
from the Many-years' Norm

(+ sign indicates later or more than the norm,  
- sign indicates earlier or less than the norm)

Natural agricultural zone (province, regions)	Time of onset of period (day)	Duration of period (days)	Mean tem- perature of period (degrees)	Percent rainfall in period
Northern Zone	+ 1-5	- 1-10	- 0.5-0.0	100-150
Southwestern regions	—	—	—	70-100
Southeastern regions	—	+ 1-5	+ 1.0-0.0	—
Non-chernozem Zone	+ 1-5	- 5-15	- 0.5-1.5	50-100
Western province (western regions)	+ 5-15	- 15-25	+ 0.5	30-60
Central Non-chernozem province (southeastern regions)	—	—	—	100-140
Northern Volga Zone	+ 5-10	- 1-10	- 1.0-0.0	60-100
Northeastern regions	—	—	+ 0.5-0.0	—
Forest-steppe Zone	+ 1-10	+ 1-10	+ 0.5-1.5	100-180
Western Ukrainian province	+ 5-15	- 5-15	—	60-100
Southern Forest-steppe province (southern regions)	—	—	+ 1.5-2.5	—
Eastern Forest-steppe province	—	—	+ 0.5	—
Steppe Zone	+ 5-15	+ 1-10	+ 1.0-2.0	100-180
Southern Ukrainian province (western regions)	—	—	+ 1.5-2.5	60-100
Central Volga province	+ 1-10	—	+ 1.0-0.0	—
Ciscaucasian province	—	- 1-10	—	60-110
Caspian Sea province	—	- 1-10	—	60-110
Transcaucasian Zone	+ 1-10	- 5-15	- 0.5-1.5	100
Virgin and Fallow Land Development Zone	+ 1-10	- 5-15	+ 0.5-1.5	60-110
Southern Ural province	—	—	+ 0.5	—
Western Siberian province (northern regions)	—	- 1-5	+ 1.5-2.0	110-130
Central province (eastern regions)	—	+ 1-10	—	here and there 140-180
Southern province (eastern regions)	—	—	- 1.0-0.0	100-160
Eastern Siberia and Transbaykal Zone	+ 1-5	- 1-10	+ 1.0-0.0	70-110
Southwestern regions	+ 5-10	- 10-20	+ 1.0-2.0	30-30
Far Eastern Zone	+ 5	+ 1-10	+ 0.5-1.5	110-170
Western regions	—	- 1-5	—	80-100
Central Asian Zone	—	—	+ 0.5-1.5	170-220
Desert-steppe province	+ 1-10	+ 5	—	—
Cotton-growing province	+ 5	5-15	—	—

the remaining territory the precipitation that fell exceeded the many-years' norm.

The wintering conditions, particularly those of the initial period, were unfavorable for mouse-like rodents. To a considerable extent they paralyzed the increase in their numbers that started in the autumn. For the remaining harmful species their influence in general did not exceed the bounds of the usual.

The late spring, in many regions rainy and cool, had a substantial effect on the destructiveness of a number of species. These conditions favored an intensification of the destructiveness of flea beetles on beets and flax, *Sitona* weevils on pea crops, the common beet weevil, grain flies and wireworms. At the same time it weakened the destructiveness of pentatomids, since the arrival flight of the beetles and their active feeding on the young crops was delayed, and during this time winter cereal grains, weak since fall, became strong and thickened out.

The late and warm spring in the Virgin and Fallow Land Development Zone in addition favored the accelerated development of wheat crops and the coinciding of their ear formation period with the large-scale flight of the moths of the gray grain outworm. This was brought about by the increase in numbers of the pest.

The summer of 1964 in the northern half of the European part of the USSR was early, prolonged, and warm, with heat exceeding the norm, a shortage of rainfall and unsteady, insufficient humidification of the territory (Table 4). Only in the Western province of the Non-chernozem Zone and the southwestern regions of the Northern Zone was sufficient provision of moisture noted in the territory. However, here too it turned out to be below the norm everywhere. In the southern half of the European part of the USSR the summer was late, short, and moderately warm (in the Western Ukrainian province and the western regions of the Southern Forest-steppe province of the Forest-steppe Zone it was warm); in the east it was cool, with insufficient heat in most regions. Rainfall — of the order of the norm and below it — assured enough moisture for the territory in the Forest-steppe Zone, in most regions of the Central Volga and Ciscaucasian provinces of the Steppe Zone and in the western regions of the Transcaucasian Zone. In the remaining territories an inadequate, unreliable, here and there poor moisture supply prevailed. Within the Asian part of the USSR, in most of the Virgin and Fallow Land Development Zone, the Central Asian Zone and the Far Eastern Zone summer also set in a little late and was relatively short and moderately warm; in the western regions and the central regions adjacent thereto of the Virgin and Fallow Land Development Zone it was cool, with a shortage of heat. At the same time in the Eastern Siberia and Transbaykal Zone, in the Western Siberian territory, the eastern regions of the Central province of the Virgin and Fallow Land Development Zone, and also in the western regions of the Far Eastern Zone summer was observed to be early, prolonged, and warm, with heat exceeding the norm. Rainfall

Table 4  
Weather Characteristics of Summer 1964 in Deviations from the Many-years' Norm

(+ sign indicates later or more than the norm, - sign indicates earlier or less than the norm)

Natural agricultural zone (province, regions)	Time of onset of period (day)	Duration of period (days)	Mean tem- perature of period (degrees)	Sum of ac- tive tem- peratures of period (degrees)	Percent rainfall during period	HTC *
Northern Zone	- 1-10	+ 1-10	+ 1.5-3.0	+ 100-300	60-90	0.7-1.0
Southwestern regions	-	-	+ 1.0-2.0	-	90-100	0.9-1.2
Southeastern regions	+ 1-10	- 1-10	-	- 100-0	-	-
Non-chernozem Zone	- 5-15	+ 5-15	+ 1.0-2.0	+ 100-300	50-100	0.8-1.1
Western province	-	-	+ 1.0-0.0	-	-	-
Central Non-chernozem province (southern regions)	+ 5	+ 5	+ 0.5-1.0	+ 100-0	-	-
Central Volga Zone	- 1-10	+ 1-10	+ 1.0-2.0	+ 50-150	50-90	0.8-1.1
Southern regions	+ 5	- 1-10	+ 0.5-0.0	+ 100	90-110	-
Forest-steppe Zone	+ 5-15	- 5-15	+ 0.5-1.5	- 150-0	65-105	1.0-1.3
Western Ukrainian province (north- western regions)	+ 5	+ 5	-	+ 200-0	55-75	0.9-1.1
Southern Forest-steppe province	-	-	-	-	-	-
Eastern Forest-steppe province	+ 1-10	- 1-5	+ 0.5	- 50-0	80-120	-
Steppe Zone	+ 5-15	- 1-10	+ 0.5	- 200-0	80-120	0.8-1.1
Southern Ukrainian province	-	-	-	-	-	0.6-0.9
Central Volga province (northern regions)	-	-	-	-	110-160	1.0-1.2
Ciscaucasian province (eastern re- gions)	-	-	-	-	-	-
Caspian Sea province	+ 1-5	+ 5	-	+ 150-0	90-130	0.7-1.0
Transcaucasian Zone	-	+ 5	-	-	-	0.5-0.8
Western regions	+ 5	+ 1-10	+ 0.5	+ 100	70-100	0.5-0.9
Southeastern regions	+ 5-15	- 5-15	-	-100-300	-	1.5-3.0
	-	-	-	-	35-60	less than 0.5

Table continued on following page

Table 4 [continued]

Natural agricultural zone (province, regions)	Time of onset of period (day)	Duration of period (days)	Mean tem- perature of period (degrees)	Sum of ac- tive tem- peratures of period (degrees)	Percent rainfall during period	HTC *
Virgin and Fallow Land Development Zone	+ 5	- 1-10	+ 0.5	- 100-300	80-120	0.8-1.2
Southern Ural province	-	- 5-15	-	-	100-160	1.1-1.5
Western Siberian province (southern regions)	- 5-15	+ 5-15	+ 0.5-1.5	+ 100-300	-	-
Central province (eastern regions)	- 5-15	+ 5-15	+ 0.5-1.5	+ 100-300	-	0.7-1.0
Southern province	+ 1-10	-	-	- 100-0	60-100	less than 0.5
Eastern Siberia and Transbaykal Zone	- 1-10	+ 5-15	+ 1.0-2.0	+ 100-500	100-130	1.0-1.5
Northwestern regions	-	-	-	-	50-90	0.7-1.0
Northeastern regions	+ 1-10	- 5-15	-	- 100-300	60-90	0.7-1.0
Southeastern regions	-	-	+ 0.5	-	70-100	0.9-1.2
Far Eastern Zone	+ 1-10	- 1-10	+ 0.5	- 200-0	100-130	1.2-2.0
Western regions	- 1-5	+ 5-15	-	+ 100-300	90-100	1.3-1.5
Central Asian Zone	+ 5-15	-	+ 1.0-0.0	-	-	less than 0.5
Desert-steppe province	-	- 1-10	-	- 150-0	60-100	-
Cotton-growing province	-	- 10-20	-	- 150-300	30-70	-
Southern regions	- 5-15	- 1-10	- 1.0-0.0	- 200-400	160-280	-

\* HTC — hydrothermal coefficient, characterizes the provision of moisture to the territory.

-- within and below the norm -- provided the territory in the Far Eastern Zone, most of the regions of the Eastern Siberia and Transbaykal Zone, and also in the Southern Ural and Western Siberian provinces and the northern regions of the Central province of the Virgin and Fallow Land Development Zone with sufficient moisture. In most of the Virgin and Fallow Land Development Zone insufficient and unsteady provision of moisture predominated; in the Southern province poor and markedly insufficient provision of moisture to the territory predominated. In the Central Asian Zone a rainfall shortage and markedly insufficient provision of moisture were noted almost everywhere.

The autumn of 1964 in the European territory of the USSR set in on dates close to the dates for a number of years; in the western regions and the central regions adjoining them, and also in the northeastern and some southern (foothill and mountain) regions it was somewhat earlier than the norm; in the remaining territory it was later (Table 5). Almost everywhere it was prolonged and dry. An especially prolonged autumn was noted in the central and southern regions of the Ukrainian SSR. Here it ended 25-35 days later than the norm (at the end of December -- in January). This determined the temperature indices of the season. In the northern half of the European part the autumn was moderately warm (in the Central Non-chernozem province of the Non-chernozem Zone it was warm). In most of the southern regions, in spite of the fact that the temperatures of the autumn months exceeded the temperatures for a number of years, on the whole during the period they proved to be below the norm. In most of the Asian part of the USSR autumn set in and ended earlier than the dates for a number of years, was pleasant, short, warm and dry. It began somewhat later than the norm in the Eastern Siberia and Transbaykal Zone and also in the Desert-steppe province of the Central Asian Zone. In the territory of the Southern Ural province and the adjoining regions of the Virgin and Fallow Land Development Zone a prolonged and relatively wet autumn was observed. An early onset of cold weather in the Cotton-growing province of the Central Asian Zone should be noted.

The summer conditions favored intensive development and destructiveness of pentatomids and other grain bugs, grain beetles (especially in the Volga region, in the south of the Ukrainian SSR and in the central regions of the chernozem belt), aphids on peas, and the cabbage cutworm. They also favored the increase in numbers and good preparation for winter of the common beet weevil, the turnip moth (in the Ukrainian SSR and Krasnodarskiy Kray), flea beetles damaging beets and flax, and aphids damaging peas. In a number of fruit-growing regions the rate of development of and the damage by the codling moth increased.

The warm summer in the Virgin and Fallow Land Development Zone in a number of places brought about a development without diapause of the gray grain cutworm, which reached the pupa stage in the autumn; this sharply reduced the winter hardiness of the pest. Sufficient humidification determined the vigorous development of rust fungi. Abundant rainfall in the grain-forming period and the early onset of cold weather brought about large-scale damage to physiologically immature spring wheat grain by fungus diseases (helminthosporiosis, fusariosis, etc.).

Table 5

Weather Characteristics of Autumn 1964 in Deviations from the  
Many-years' Norm

( + sign indicates later or more than the norm,  
- sign indicates earlier or less than the norm)

Natural agricultural zone (province, regions)	Time of onset of period (day)	Duration of period (days)	Mean tem- perature of period (degrees)	Percent rainfall during period
Northern Zone	$\pm 5$	+ 1-10	$\pm 0.5$	75-115
Southeastern regions	- 5-0	- 1-10	+ 0.5-1.5	—
Non-chernozem Zone	—	—	—	—
Western province	- 1-10	+ 5-15	+ 1.0-0.0	80-110
Central Non-chernozem province	+ 1-10	- 1-10	+ 0.5-1.5	30-60
Central Volga Zone	$\pm 5$	+ 1-10	+ 0.5-0.0	50-90
Northeastern regions	—	—	- 0.5-0.0	90-110
Forest-steppe Zone	- 1-10	+ 10-20, here and there + 30	$\pm 0.5$	80-120
Western Ukrainian province	—	—	—	—
Southern Forest-steppe province (eastern regions)	+ 1-5	+ 1-10	—	40-60
Eastern Forest-steppe province	+ 1-5	- 1-5	+ 0.5-1.0	40-60
Steppe Zone	+ 1-10	+ 5-15	- 0.5-1.5	60-100
Southern Ukrainian province *	—	+ 20-30	—	—
Central Volga province	—	—	—	40-80
Ciscaucasian province (foothill regions)	- 1-5	$\pm 5$	$\pm 0.5$	80-120
Caspian Sea province	—	—	—	—
Transcaucasian Zone	The autumn months in most of the regions were cool and dry.			
Virgin and Fallow Land Development Zone	- 1-10	- 1-10	+ 1.0-2.0	80-120
Southern Ural province	- 5-15	+ 1-10	—	100-170
Western Siberian province (eastern regions)	+ 1-5	- 10-15	+ 2.0-2.5	40-80
Central province (western and southwestern regions)	+ 1-10	—	- 1.0-2.0	—
Southern province (western and southwestern regions)	+ 1-10	—	- 1.0-2.0	—
Eastern Siberia and Transbaykal Zone	+ 1-10	- 5-15	+ 1.0-0.0	30-60
Southeastern regions	—	—	- 0.5-0.0	60-90

[Table continued on the following page]

Table 5 [continued]

Natural agricultural zone (province, regions)	Time of onset of period (day)	Duration of period (days)	Mean tem- perature of period (degrees)	Percent rainfall during period
Far Eastern Zone	- 5-0	+ 5	- 0.5-0.0	80-130
Western regions	+ 5-15	- 5-15	- 0.5-1.5	100-160
Central Asian Zone	—	—	—	—
Desert-steppe province	+ 5	+ 1-10	- 0.5-1.5	50-80
Cotton-growing province	- 1-10	- 5-15	+ 0.5-1.5	20-50

- \* In the western regions of the Southern Ukrainian province a steady temperature transition through 0° (end of autumn — start of winter) was noted only in the second decade of January (the norm was the first decade of December).

On evaluating the general effect of the weather characteristics of the preceding year and man's farming activity on the distribution, development and destructiveness of the principal harmful species in 1965 it should be recognized that the importance of pentatomids and grain beetles, the common beet weevil and the turnip moth, and locally the grain cutworm, increased.

The destructiveness of most harmful species will be kept approximately at the 1964 level or undergo merely local changes, for example mouse-like rodents, the grain carabide, and the corn borer. The importance of the beet armyworm will drop, but that of the cabbage cutworm will be maintained.

It should always be remembered that the ultimate importance of harmful species depends not only on their distribution and development, but also on the effectiveness and extent of the measures for protecting plants from them.